

Master streams were then placed into service to knock down the bulk of the fire. An elapsed time of approximately twenty minutes occurred while crews fought the fire in the office and shipping area. SFD Officers discussed making another attempt to locate Monroe. The master streams were shut down, allowing time for the smoke to clear and evaluate the interior conditions. At this point a hose team was put together by members of SFD and a team lead by SFD Officers proceeded in with the hose team to locate Monroe. After a quick search Monroe was located and removed by members of SFD before a catastrophic collapse of the building occurred.

At this point the Fire Operations Center began operation at Salisbury Station 1. They made a request for a full box alarm from Charlotte Fire Department. The request was made by Charlotte Battalion Chief (Battalion 2, Division B) for a full structural alarm including the USAR Team, Field Com and a team of Chaplains. Charlotte Fire Alarm dispatched all of the requested resources as well as a PIO.

The first course of action was to work with SFD staff to remove all SFD members operating on the scene and relieve them with the CFD alarm. Battalion 2 began implementing a command staff which allowed for the command post to be relocated to Station 1 while he assumed on scene operations.

SUMMARY OF WATER USAGE:

Quint 2 was the first fire apparatus to arrive and functioned as the first arriving engine company. A (5") water supply was established at Martin Luther King Jr Ave (MLK) and the entrance to HBD Industries. Quint 2 initially pulled off a 2 ½ hose-line capable of flowing 325 GPM to the basement. A 1 ¾ line was also pulled to the basement capable of flowing 200 GPM. The aerial was also later placed into service with an estimated 1000 GPM. A 2 ½ line was used to supply Engine 452 as Engine 452 attacked the fire defensively with a 1 ¾ (200 GPM) Class A foam line just prior to the master stream being placed in service. The maximum flow at any given time from Quint 2 would not have exceeded 1300 to 1400 GPM.

Quint 4 was the third Quint Company to arrive on the scene. They established a secondary (5") water supply from Julian Road and functioned as the second due engine per their pre-designated assignment. They initially pulled a 2 ½ line to back up Quint 1 in the office area. The line was capable of flowing approximately 325 gallons per minute. As the fire progresses another 1 ¾ line was pulled with the capability of flowing 200 gallons per minute, however, this line was never placed in service. A single 2 ½ inch line was pulled to supply Quint 1 with the ability to supply approximately 300 gallons per minute. At the time of the May-Day the 2 ½ line from Quint 4 and the 2 ½ supply line going to Quint 1 were the only lines in-service. Another 1 ¾ was utilized by the Engineer to keep the apparatus cool. Based on Quint 4's water supply, they were capable of providing approximately 1500 gallons per minute at any given time.

Quint 1 received a 2 ½ supply line from Quint 4 and placed a 2 ½ line in service to the basement Delta side of the office. A 1 ¾ line was also placed in-service on the Alpha side at the office door; however it was not utilized. These handlines were shut down as crews were ordered out of the building and an aerial master stream was placed into service for the office area. After the IAP was updated the Basement Division preceded into the uninvolved portion of the basement to recon the firewall. They found the 2 ½ inch line left in the basement on the Delta office side. As they continued to recon the basement they located the stairs next to the firewall going into the Division 1 tool room. Fire was breaching the firewall and they utilized the 2 ½ line to attack the fire, however the fire was too intense and they were encountering water pressure issues and were forced to retreat their positions. The May-Day was issued and the aerial master stream was shut down. A second 2 ½ was received from Quint 2 after the May-Day and a master stream monitor was placed into service on Alpha side at the loading dock. Quint 1 was only receiving a supply of approximately 300 gallons per minute from Quint 4. They were unable to provide an effective master stream and 2 ½ attack line simultaneous, explaining the pressure issues the Basement Division was experiencing with the 2 ½ line.

Quint 3 established a (5") water supply from MLK and the entrance of Salisbury Mill Works. The line was established as a precautionary means for defensive operations. Quint 3 spotted their apparatus on the "A-D" corner; they did not utilize any lines from their apparatus.

Adequate water supplies and pressures were available via the municipal hydrants prior to 100% involvement of the structure, and when taxed at 100%, an alternate method of supply was employed.

FIREGROUND FACTORS & POST-INCIDENT COMMENTS:

Introduction - As we internally review this incident our focus is placed on what can be learned to help improve and prevent this type of tragedy for the fire service in the future.

Radios and Communication issues are a main factor associated with this incident. Weather, hoseline operations, pre-plans, stream placement, and strategies for protecting exposures, situational awareness, as well as Incident Command functions are also areas which have been reviewed to help improve future operations for the fire service as a whole.

While this incident had a tragic ending, many officers and crew members of the Salisbury Fire Department made sound and heroic decisions on March 7, 2008.

- At least two Rapid Intervention crews were implemented at the onset and multiple water supplies (3) were established utilizing five inch supply lines.
- Apparatus were placed in a position which allowed crews to take up a defensive position when required.
- Lifelines were tied together and secured on the exterior of the building, providing at least two separate points of egress for interior crews working on Division 1.
- Crews utilized 2 ½ lines as the primary attack lines, recognizing the need for a larger fire flow.
- The Incident Commander continuously requested PAR's and updated his Incident Action Plan with his staff and the building owner.

Radios – While reviewing the radio communications associated with this incident there are many instances in which transmissions by crews were unreadable, did not transmit or were overridden. Quint 4 Captain attempted to contact outside crews nineteen (19) times with his radio and one (1) time with what he recalls as Isler's radio (may have been over ridden, does not show on the ping report) prior to transmitting a successful May-Day. The rider on Quint 4 also made an effort once (1) to transmit as he was on the loading dock. His account was in effort to relay a message to his Captain and advise him the fire was behind the crew, however, that too was not successful. Failed communications were discussed at length with the Captain of Quint 4 during the interview process. He confirms he attempted to call the outside crews and get assistance pulling his 2 ½ hoseline back to a safer location for his crew. His transmissions were unsuccessful, leading to a spaghetti section of hose which made it difficult for his crew to follow and exit safely under extreme conditions. According to recorded data, there are a total of twenty (21) transmissions from Quint 4 which failed. These occurred from the time Quint 4 last entered until the successful May-Day was issued.

Comment – Unreliable radio communications are not acceptable to the Salisbury Fire Department or the fire service in general. After reviewing the radio traffic and detailed reports of the communications related to this incident, we began the task of taking an in-depth look at our radio system. As a result we have learned that radios have an internal crystal, and when subjected to rigorous activities can fall off

frequency as they receive and transmit. The Salisbury Fire Department issues every firefighter a modern portable radio, however, fire service radio transmissions often fail in buildings encased with brick and steel. Portable radios also fail to work well in the conditions firefighters encounter most, (heat, smoke, water). To facilitate better reliability, daily portable radio test will be completed to assure transmission and receiving capabilities. Turning on the radio and simply assuring the LED functions properly does not assure the internal components are functioning properly. It will also become routine practice that any radio dropped from a height of two feet or greater, exposed to extreme heat or submerged or exposed to significant amounts of water be tested for proper operation.

We have also learned that radios can be bench tested much like self contained breathing apparatus (SCBA). SFD conducts annual testing of hydrants, ladders, fire pumps, PPE (SCBA) and many other operational components of our industry, why not the radios? Effective immediately and per a new SOG the Salisbury Fire Department will bench test all radios and check the following annually and/or when a radio is damaged:

- Battery and contacts
- Track and document all radio troubles related to (transmission and hardware issues)
- Antenna
- Speaker Mic and cords
- Placed on a service monitor to check the following:
 - Power out transmission
 - Inspect the frequency
 - Inspect the transmit modulate
 - Inspect the receive side frequency
 - Inspect the receiver sensitivity
 - Inspect the receive audio

The Fire Department in collaboration with the City Information Technologies Division is also reviewing and studying the digital radio system against the analog system, DVR's, water submersible radios, mics and voice over channel capabilities. Fire Departments around the country have struggled for many years with these two radio problems (poor transmission in brick and steel buildings, and susceptibility to common firefighting conditions of heat, smoke and water.) Radio manufacturers are also aware of these problems and trying to improve reliability. Some recent models may be more reliable in fire fighting conditions but even new models have not overcome the brick and steel related transmission problems. The Salisbury Fire Departments radios were among the best available when acquired in 2001. Replacement of the current portable radios utilized by the Salisbury Fire Department with a recently developed and more rugged, water submersible radio is planned for the fall of 08. Even with an aggressive radio policy, there is still not a specific fix for radios in larger commercial type buildings. The Fire Department will continue to evaluate alternatives as new technology becomes available. See Appendix "A" for New Radio Policy

Incident Command Functions – The Incident command system was fully and correctly employed on March 07, 2008 and the initial Battalion arriving on the scene established Command. As responding fire units and on call staff arrived, the Incident Command functions were expanded to incorporate a Safety Officer, Operations Officer, and Division Bravo. As the incident continued to expand an Alpha Division is added as well as a Basement Division. Off duty chief officers supported the command function. Two

off-duty Battalion Chiefs reported to Station 1 and opened a Fire Operations Center (FOC) assuring city wide fire protection remained in order.

Comment – We will continue to train all ranking officers to the NIMS 400 level, and all terminology will coincide with that established through the NIMS standards. It is also recognized that to provide optimum and adequate safety and accountability measures, a fire incident technician position needs to be added to assist the Incident Commander in his/her task to provide a safe and accountable fireground. SFD will seek additional positions for fire incident safety technicians in future budgets.

Weather – On this date the wind was gusting at 21 mph from the east. Heavy rains were in the area which saturated many of the radio mics being used by the fire companies. The east wind was blowing from the leeward (Bravo) side of the structure to the Delta side of the structure. Several office windows and doors were removed on Division 1 by fire crews or the fire itself. Opportunity for forced air to enter into and across the office and basement may have contributed to the fire growth through the stairs and on the first floor of the office. An office door opening up to the loading dock also allowed fire to extend into an auto-exposure (window) which opened into the stairway connecting the basement to the first floor tool room in the shipping area (the two are separated only by a few feet). This fire spread was undetected due to the heavy, low laying smoke present around the loading dock. This also provides an explanation for the heavy fire observed entering the window by the Recon Team as they attempted to protect the stairway just prior to the MAYDAY.

Comment – We will continue to train and emphasize the importance of situational awareness and knowing the elements encountered on the fire ground, how the fire will react to these elements and the significant impact it will have on the spread of fire.

Exposure Hose-line and Communication – There were two doors leading into the office area from the shipping warehouse. **1.** A door located near the loading dock and along the fire wall separating the office and shipping warehouse, **2.** A larger doorway located along same wall approximately 30' from the first door. The two doors were separated by a small tool room located between them. The exact location of hoseline being utilized as an exposure protection line was not clear to the Operations and Safety Officers, who were aware only of the first door, near the loading dock. When informed by Quint 4 Captain that his company's (Quint 4) previous location by the doorway was a good place to protect exposures, Operations and Safety understood this to refer to the first door, when Quint 4 Captain was actually referring to the second door where he made his initial entry through the second door leading into the accounting office area. As the line was retrieved from the office and repositioned in the shipping area for an exposure line it became kinked and twisted which made it difficult for crews to exit the building rapidly under extreme flashover/fire conditions. The Captain utilized his personnel accordingly by distributing them along the line to pull it back and maneuver it. The Captain also attempted to notify outside crews for assistance in repositioning the line, however, his radio transmissions were unsuccessful.

Comment –The position of defensive/exposure hoselines as well as offensive hoselines must be communicated clearly between the Incident Commander and the hose team during fireground operations. It is also essential that company officers as well as the incident commander and command

staff clearly communicate the location of and thoroughly evaluate all defensive positions to ensure they remain safe and defensive in nature as crews protect property. The Salisbury Fire Department will also continue to work and focus on hose handling skills as a part of daily and routine training. It is common practice to provide a slack-man, door-man and nozzle-man for every hoseline; however, in some cases it becomes difficult to place a firefighter at every door, corner and turn as teams advance and retreat hose into and from commercial buildings. In cases where hose advancements may be significant in length or require teams to manipulate multiple turns, debris or doorways the need for a crew of more than four (4) may be required.

Master Streams – Master Streams were utilized to help contain the office fire to the building of involvement. They do not appear to have had a direct impact on this operation; however, large amounts of water applied to the office area may have expedited the collapse of the office floor. The supply line from Quint 4 to Quint 1 (2 ½) did not provide maximum flow.

Comment – The Master Streams were confined to the office area and were not interfering with the defensive stand being made by Quint 4 at the firewall. Insufficient water from Quint 1 did create fluctuation in the 2 ½ line unknowingly operated along the firewall by the Basement Division Recon Team, however the fire encountered by this crew was progressing through the firewall and too intense for them to fight. The master streams were shut down as soon as the May-Day was issued. In the future elevated master streams will not be operated with a supply of less than two dual (2) 2 ½.

Pre-Plans – The pre-plans utilized by the Salisbury Fire Department were modeled after the National Fire Academy Quick Access Forms. The pre-plan for this facility was current and utilized as a part of the planning process, however, this pre-plan as well as others do not provide modern, detailed pictures and data of the structure.

Comment – We will develop and use the modern technology provided for detailed pictures and data of facilities located with-in the City of Salisbury. This information should include in-depth data regarding firewalls and breeches located in them as well as the rated doors associated with them. A complete understanding of the buildings construction features, fire travel, fire behavior, exposures as well as auto-exposures, occupancy loads, fire loads, fire protection, early warning devices, Hazardous Materials, required fire flows and needed resources. Pre-Plans will also include three dimensional pictures of the facility and surrounding area.

Fire Spread – Crews were operating in areas recognized as safe and protected by firewalls. Auto exposures and the collapse of the floor in the office area provided a sudden and unexpected path of travel for the fire to spread into the shipping area. As the fire extended through these unforeseen openings the smoke and years of built up sawdust trapped in the ceiling and roof supports of the shipping area most likely ignited rapidly, resulting in total engulfment or flashover of the entire shipping area in a very short period of time.

Comment – In the event crews have to operate or protect a firewall or anytime they are in harm's way, even on defensive fires a back-up line will be in place. The ceilings in the mill were high (10' to 12') allowing a greater than normal amount of combustible smoke overhead. Continued training on the art

of reading smoke is essential for all personnel. Alarms for all structures will be reviewed and adjusted to include automatic dispatch of additional resources where required.

Water Pressure: Required Fire Flows: See Appendix "B" for Fire Flow Model of the Area

- 2,813 GPM @ 25% involvement
- 5,625 GPM @ 50% involvement
- 8,438 GPM @ 75% involvement
- 11,250 GPM @ 100% involvement

Comment: All indications are there was sufficient water supply to contain and extinguish the involved areas of the plant which encompassed less than 10% of the building. The required fire flow would have been 2,813 GPM at 25% involvement with an available flow of 4,300 GPM. At least one crew reported a fluctuation in water pressure which is believed to be the 2 ½ line from Quint 1 going into the basement on the Delta side of the office. This fluctuation most likely occurred from the lack of supply flowing into Quint 1 from Quint 4, however it should be noted this line was intentionally removed from service when master streams were placed in serve. Quint 4 reported their line went completely dead at the nozzle as a MAYDAY was issued. A significant rupture or tear in this line was communicated verbally by the Captain upon his exiting from the building and can be attributed to any number of causes including mechanical damage resulting from the hose coming into contact with sharp objects as portions of the tool room collapsed or thermal damage from the fire. The total flow at the time of the May-Day is calculated to be between 1600 and 1800 GPM which was sufficient at 6% to 10% involvement.

Accountability: In accordance with (Policy 3:12:05) Personnel Accountability, personnel tags were collected from responding apparatus and mutual aid companies reporting to the incident. A staging officer was utilized to track and maintain continuity of all companies in Level II staging.

The Salisbury Fire Department also has policies in place that stress the importance of keeping crews together in warehouse facilities and big box structures (Policy 6.03.19). The Incident Commander implemented two Rapid Intervention Crews at the on-set of the incident and frequently accounted for all personnel.

Comment: It is recognized that fire officers and firefighters work in sometimes extreme and changing situations. Decisions made on the fire ground are sometimes made within a window of only a few seconds. These decisions are based on the present conditions they are faced with, their training and their instincts, all while keeping the safety of themselves and their personnel first and foremost in their thoughts and actions

The Salisbury Fire Department will continue to train on current policies which emphasize the importance of maintaining continuity of the company, firefighter self-survival and May-Day situations. We will also continue to critique and evaluate all significant incidents to assure accountability and continuity of teams is being practiced. Enhanced training of these factors will be incorporated into our daily regimen.

Personnel Accountability Reports (PARS): PARS in the fire service refer to an accountability report from working crews to the Incident Commander, confirming the location and safety of crews. It is normal practice for the Salisbury Fire Department and the Fire Service as whole to conduct accountability checks while on the scene of an incident. During the course of this event and prior to the May-day the Incident Commander completed at least four accountability checks of personnel. Times recorded on Fireground 2 include the following.

07:27:13 08:04:27 08:24:14 08:34:06

Buddy System: SFD policy regarding crew continuity was formally established in March of 2007 and was taught and enforced for years prior. Common fire training curriculum and on-scene operations require that hose line maneuvering and other basic fire scene operations inside smoke filled atmospheres teach and instruct that members operate along hose- lines and are sometimes not in physical or visual contact with each other (i.e.: Slack-man/men). These line positions often push/pull charged hose lines around corners, through doorways, etc.

Comment: The Salisbury Fire Department has increased minimum staffing in three (3) fire companies to four (4) firefighters to facilitate the best possible position to provide the buddy system when operating in smoke filed buildings. The Department will seek additional staff positions to standardize 4-man-minimums to the remaining two fire companies in the upcoming budget process. New training curriculum is also being developed to facilitate "in voice and/or visual contact" standards.

Respiratory Protection Fit test: See Appendix "C" All SFD members have been required to be fit tested prior to wearing a SCBA mask since 1995. (Note: This issue is/was not associated with the March 07, 2008 incident)

Comment: Modifications to policy include an annual fit test be conducted on the date of the member's respiratory protection annual physical.

2-in/2-out: See Appendix "D" The Salisbury Fire Department SOP for structural fires includes Pre-Designated Company Assignments (PDA). The SOG outlines typical company functions and actions to perform as they arrive on the scene of a fire, based on the order of arrival. The 2-in/2-out safety team was met by predetermined orders through the PDA SOG.

The SOG existing on March 07, 2008 provided a safety team to be manned and placed in operation by the third arriving Quint, which are tasked to establish a secondary water supply and man a safety back-up line. This safety team is then assigned other duties after a full RIT (rapid Intervention team) is established, typically by off-duty SFD crews or mutual aid crews.

Comment: SFD has modified the PDA SOG to establish the 2-in/2-out safety team with the second arriving unit prohibiting the first arriving crews from entering an IDLH area until the second arriving company is in place with the exception to "known and confirmed" rescue situations.

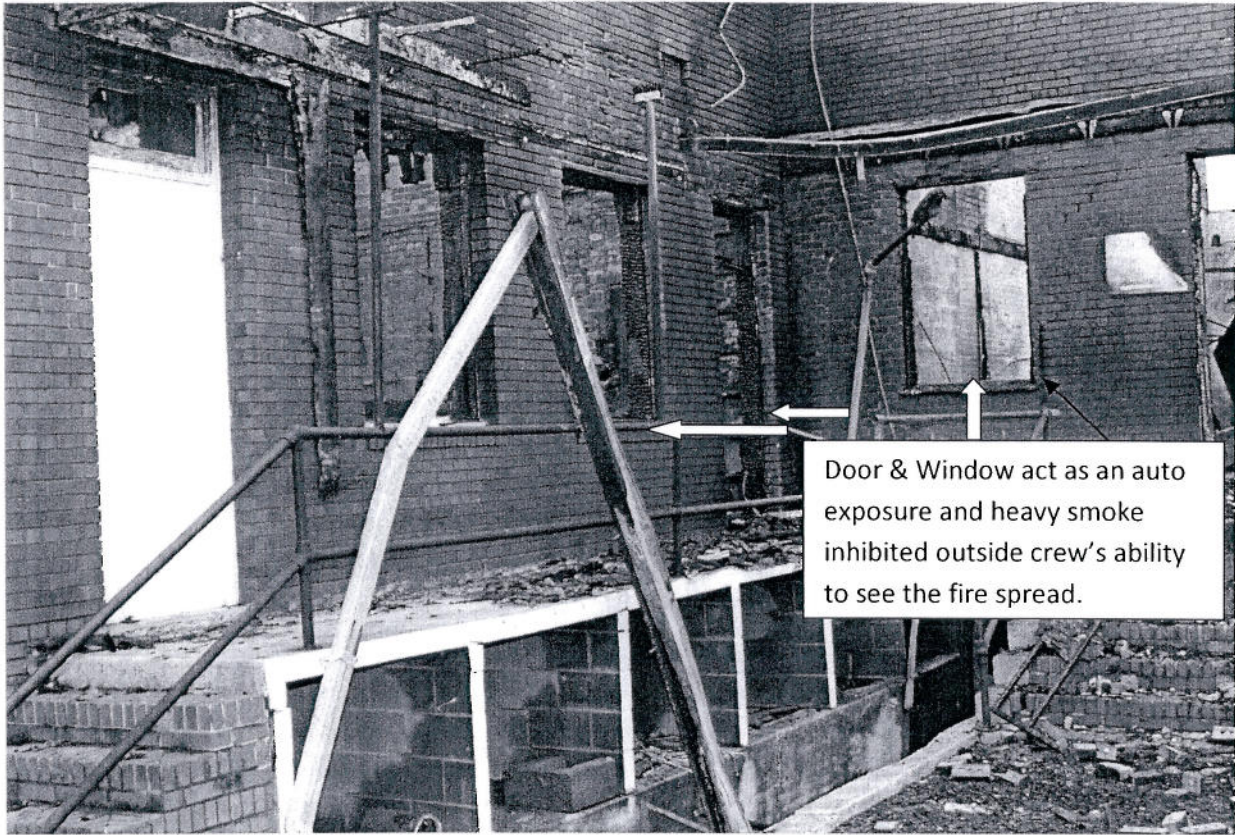


Photo "A" - View of Delta side office and Alpha side loading dock area leading into the tool room.



Entrance into Basement area on Delta Office side

Photo "B" - View of Delta Side Office leading into the Basement.